

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 3, 4, 6, 11, 18, 19 28-30, 41 and 45-55 are pending in the present application. Claims 1 and 45 are amended by the present amendment. Claims 9, 10, 17, 20-25 and 31-40 are previously cancelled.

Claim amendments and new claims find support in the application as originally filed, for example, in Figs. 21B, 21C and 21D and the corresponding disclosure. Thus, no new matter is added.

In the outstanding Action, Claim 1 was objected to as including an informality; Claims 1, 3, 4, 11, 28-30, 41, 45 and 47-53 were rejected under 35 U.S.C. §103(a) as unpatentable over Raoux et al. (U.S. Pat. No. 7,004,107, herein “Raoux”) in view of Annaratone et al. (U.S. Pat. No. 5,849,372, herein “Annaratone”) and Ohmi (U.S. Pat. No. 5,272,417); Claims 6 and 46 were rejected under 35 U.S.C. §103(a) as unpatentable over Raoux, Annaratone and Ohmi in further view of Collins et al. (U.S. Pat. No. 6,252,354, herein “Collins”); and Claims 18, 19, 54 and 55 were rejected under 35 U.S.C. §103(a) as unpatentable over Raoux, Annaratone and Ohmi in further view of Hillker (U.S. Pat. No. 6,631,693).

With respect to the objection to Claim 1 as including informalities, Claim 1 has been amended to overcome the objection. Accordingly, Applicants respectfully request that the objection to Claim 1 be withdrawn.

Addressing now the rejection of Claims 1, 3, 4, 11, 28-30, 41, 45 and 47-53 under 35 U.S.C. §103(a) as unpatentable over Raoux, Annaratone and Ohmi, Applicants respectfully traverse this rejection.

Amended Claim 1 recites, in part,

an impedance setting section provided in addition to the matching circuit and arranged between said one of the first and second electrodes and the matching circuit on the first interconnection, the impedance setting section being configured to select a higher harmonic of a fundamental frequency of the RF power, which is input from the plasma into the first interconnection, and to set an impedance relative to the selected higher harmonic thereby causing the higher harmonic to increase by a resonance action, the impedance setting section being capable of changing the selected higher harmonic to be treated as a resonance target; and

a controller which supplies a control signal for controlling the impedance setting section to control a characteristic of a plasma process performed in the process chamber,

wherein the impedance setting section comprises:

an impedance change unit connected to the first interconnection through a shunt and configured to select the higher harmonic as a resonance target, and

a filter disposed on the shunt between the first interconnection and the impedance change unit and configured to cut off the fundamental frequency of the RF power.

Claim 45 recites similar features with regard to setting an impedance relative to a selected higher harmonic.

Raoux describes an impedance tuner 108 that is used for the impedance of reactor 30. However, as acknowledged on page 4 of the outstanding Action, Raoux does not describe or suggest the impedance setting section as is recited in Claim 1.

Specifically, Raoux does not describe or suggest an impedance setting section that is configured to select a higher harmonic of a fundamental frequency of the RF power and to set an impedance relative to the selected higher harmonic thereby causing the higher harmonic to increase (or grow) by a resonance action, the impedance setting section being capable of changing the selected higher harmonic to be treated as a resonance target, as is recited in Claim 1.

Nevertheless, the outstanding Action has cited Annaratone as curing the deficiencies of Raoux with regard to the claimed invention.

Annaratone describes a plasma reactor in which the probe distances and the pressure in the chamber are varied in order to achieve higher voltages in the plasma. For instance, Annaratone describes that at different pressures the fourth, fifth and sixth harmonics of the fundamental frequency are achieved by varying the pressure in the chamber. Further, Annaratone describes that for each of these harmonics a maximum voltage can be achieved at different probe distances (See Fig. 3).

However, Annaratone does not describe or suggest that an impedance setting section that is configured to select a higher harmonic of a fundamental frequency of the RF power and to set an impedance relative to the selected higher harmonic thereby causing the higher harmonic to increase (or grow) by a resonance action, the impedance setting section being capable of changing the selected higher harmonic to be treated as a resonance target, as is recited in Claim 1.

In other words, in Annaratone a higher harmonic of a fundamental frequency is achieved by varying a pressure in a chamber and is not selected by an impedance setting section. Further, Annaratone is unable to change the higher harmonic to be treated as a resonance target without changing the pressure in the chamber something that is not carried out by an impedance setting section.

Further, Annaratone does not describe setting an impedance relative to the selected higher harmonic to thereby causing the higher harmonic to increase by a resonance action. In contrast, in Annaratone, the probes are moved to different locations in order to create a higher voltage.¹

Thus, Annaratone does not cure the deficiencies of Raoux with regard to the claimed invention.

¹ See Figure 3 of Annaratone.

Nevertheless, the outstanding Action has cited Ohmi as curing the deficiencies of Raoux and Annaratone with regard to the claimed invention.

Ohmi describes a plasma process device which includes a power supply 110, a matching circuit 108 and a band eliminating filter 401. Further, Ohmi describes that band eliminator 401 is comprised of resonating circuits 402 and 403 which have higher impedance for two predetermined frequencies and are short-circuited to all other frequencies.

However, Ohmi does not describe or suggest setting an impedance relative to a selected higher harmonic to thereby amplify by a resonance action the higher harmonic of a fundamental frequency of the RF power, which *is input from the plasma* into the first interconnection.

In contrast, in Ohmi, the resonating circuits 402 and 403 ensure that power supplied from power supply 110 to the susceptor electrode 104 is supplied selectively at only these two frequencies.

Thus, Ohmi does not cure the deficiencies of Raoux and Annaratone with regard to the claimed invention.

Accordingly, Applicants respectfully submit that Claim 1 and similarly Claim 45 and claims depending therefrom patentably distinguish over Raoux, Annaratone and Ohmi considered individually or in any proper combination.

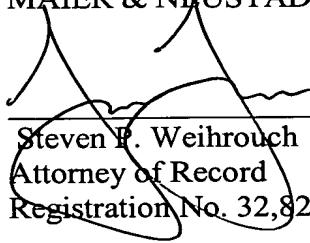
Further, the further cited Collins and Hilliker references do not cure the above noted deficiencies of Raoux, Raoux, Annaratone and Ohmi.

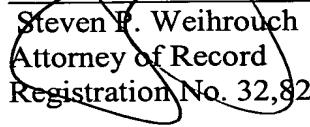
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Consequently, in light of the above discussion and in view of the present amendment the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.


Steven P. Weihrouch
Attorney of Record
Registration No. 32,829


James Love
Registration No. 58,421

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